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WATER PROBLEM IN THE PENNSYLVANIA ANTHRACITE MINING REGION

BY

S. H. ASH

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

WATER PROBLEM IN THE PENNSYLVANIA ANTHRACITE MINING REGION[1]

By S. H. Ash[2]

INTRODUCTION

The Pennsylvania anthracite-mining region is the only one in the world of major magnitude. As the deposits of anthracite in the United States are limited virtually to Pennsylvania, the difficulties of this industry have been commonly considered a State rather than a national problem. However, there is also national interest in the conservation and wise utilization of all fuel resources and in the control of interstate waterways.

The anthracite industry is confronted with the very serious problem of accumulation of water in many of the mines. This problem must be solved soon if progressively higher mining costs are to be avoided.

The water problem cannot be solved by the operating companies without State or Federal aid, or both, owing to the magnitude of the work required, diversity of interests of the coal and surface ownerships, hazard to the whole mining community, and interests affected outside the mining region. The cost of abating the ever-increasing surface seepage to mine workings and of handling this seepage once it has occurred is beyond the economic resources of most operating managements.

The data in this paper giving the high lights of the water problem and indicating what appears to be a step in the right direction are based upon observations made during the past year that the industry desires and believes it is to the "public interest" to keep mine workings free of flood and surface waters.

ACKNOWLEDGMENTS

The author acknowledges the assistance of the Anthracite State Mine Inspectors, operating management officials and their engineering staffs, and others in obtaining material and discussing the subject matter upon which this report is based.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7175."
Presented at the Fall Meeting of the Anthracite Section of the A.I.M.E., Wilkes-Barre, Pa., October 25, 1940.

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STATUS OF INDUSTRY

About 95 percent of the anthracite (including semianthracite) in the United States occurs in eastern Pennsylvania. The anthracite region is compact, covering about 480 square miles and straddling two drainage basins - the Susquhanna and the Delaware (see fig. 1)

Anthracite is mainly a high-grade domestic fuel. The fundamental factors underlying the industry - the character of anthracite and its geographic location near thickly populated industrial centers requiring both heat and power - remain favorable only if the industry can be helped to meet the ever-growing competitive situation.

An advanced stage of depletion[3] also has been reached, at least one-fourth of the anthracite reserves having been consumed or lost. Mining is usually difficult, and waste is great. Illegal ("bootleg") production is peculiar to the anthracite industry and is introducing a serious water problem through destruction of barrier pillars and robbing of outcrops. In recent years the total output of anthracite has been about 50 million tons annually, which is only half as much as it was in the peak years during the World War.

THE PROBLEM

In solving the water problem the industry does not seek assistance in handling conditions resulting from present operations, but rather in coping with the flooding of properties close to abandoned operations. This encroachment of water, resulting in progressive flooding of mines, is threatening to destroy anthracite reserves and is having serious effects on the economy of the anthracite region.

Past mine practices have allowed surface water to enter present and abandoned mine workings and to accumulate in mines now in operation, where it has to be pumped to the surface or drained through lower level tunnels. Active mines are thus burdened with infiltration of water from abandoned mines in addition to the water normally found in mines. As more mines are abandoned, for whatever cause, the problem becomes cumulatively more serious with regard to both economics and safety.

Lake Wallenpaupack, the largest artificial body of water in Pennsylvania, contains 71 billion gallons of water in its 24 square miles of area and is enormous when compared with Conneaut Lake, Crawford County, the largest natural body of water in the State. The magnitude of the pumping problem in the anthracite region is realized when it is known that during 1939 four large coal companies in Lackawanna and Luzerne Counties, comprising the Northern field, pumped 78,483,888,320 gallons through heads ranging from 300 to 1,200 feet, or 7-1/2 billion gallons more than is contained in Lake Wallenpaupack.

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[3] National Resources Committee, Energy Resources and National Policy: U.S. Government Printing Office, Washington, D.C., 1939, p. 119.

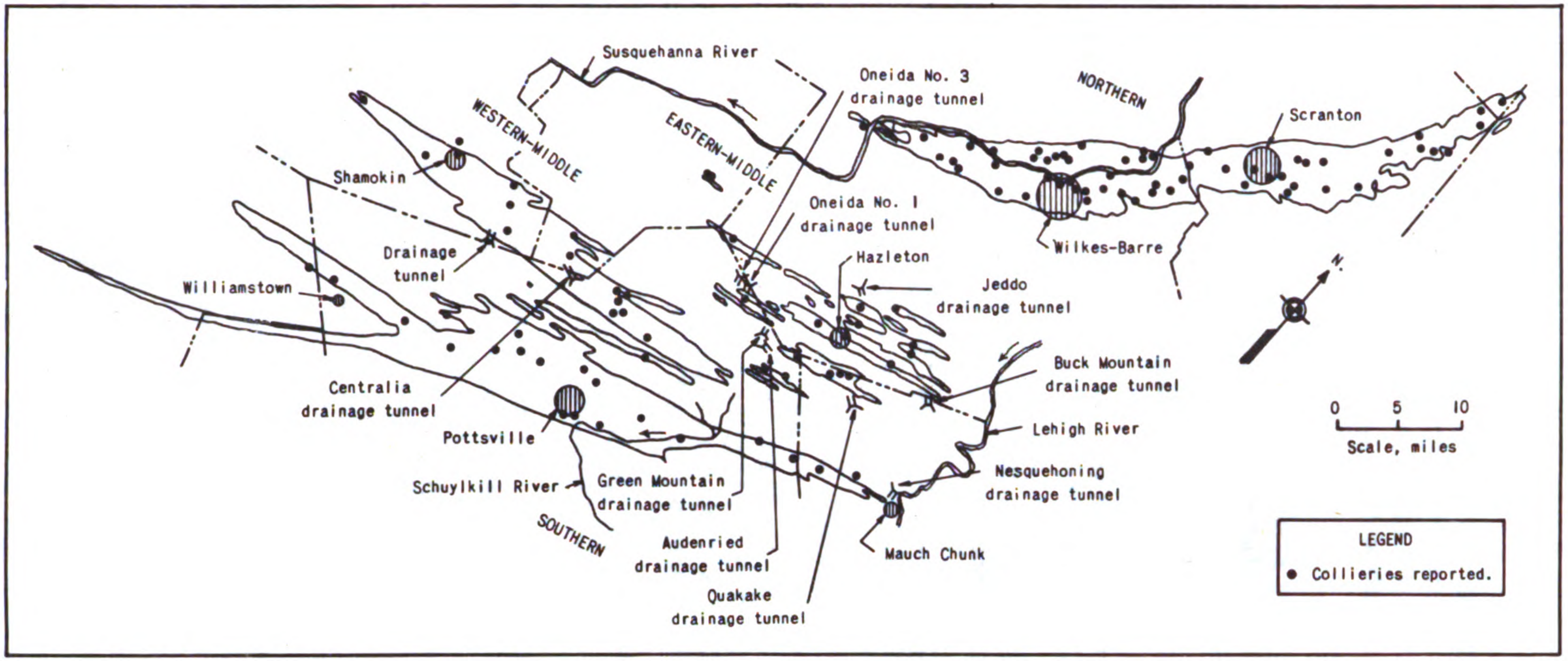

Figure 1.- Anthracite region of Pennsylvania.

In 1937[4] it was estimated that 33 tons of water was pumped for each ton of anthracite produced. The amount of water pumped at a group of 73 identical anthracite collieries increased from 19.5 tons a ton of coal in 1927 to 21.8 in 1931 and 29.3 in 1935.

When pumping is done in the region, the cost per million gallons per foot vertical ranges from 5 to 10 cents, averaging about 8 cents. The cost of pumping ranges from 14 to 20 cents a ton of coal, averaging about 16 cents for the total tonnage of the region. The annual cost of pumping in the anthracite region is about $8,000,000.

It is realized that the pumping of large amounts of water is required as a result of normal mine operations and that certain amounts must be pumped and serve useful purposes in connection with coal preparation, sewage, drinking supply, and other functions. The acidity of mine water[5] could be relieved by solving the mine-water problem.

According to available information, 42 companies reported having 342,000 gallons a minute of installed pumping capacity in 1920. In 1930, 36 companies reported[6] 489,000 gallons a minute of installed capacity, and although the number of companies pumping was fewer by 6, the pumping load had increased 43 percent in 10 years. In the Northern field, Lackawanna

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[4] Ashmead, D. C., Water Pumped from the Mines of the Anthracite Region of Northeastern Pennsylvania: Trans. Am. Geophys. Union, 18th Ann. Meeting, 1937, pp. 498-504.

[5] Leitch, R. D., Stream Pollution by acid Mine Drainage: Bureau of Mines Rept. of Investigations 2725, 1926, 7 pp.
Leitch, R. D., Observations on Acid Mine Drainage in Western Pennsylvania: Bureau of Mines Rept. of Investigations 2889, 1928, 18 pp.
Leitch, R. D., and Yant, W. P., A Comparison of the Acidity of Waters from Some Active and Abandoned Coal Mines: Bureau of Mines Rept. of Investigations 2895, 1928, 8 pp.
Leitch, R. D., Yant, W. P., and Sayers, R. R., Effect of Sealing on Acidity of Mine Drainage: Bureau of Mines Rept. of Investigations 2994, 1930, 11 pp.
Leitch, R. D., The acidity of Bennett Branch of Sunnemahoning Creek, Pa., During Low Water: Bureau of Mines Rept. of Investigations 3097, 1931, 6 pp.
Leitch, R. D., General Review of the United States Bureau of Mines Stream-Pollution Investigation: Bureau of Mines Rept. of Investigations 3098, 1931, 7 pp.
Leitch, R. D., The Acidity of Black Lick, Two Lick, and Yellow Creeks, Pa., During Low Water in 1930: Bureau of Mines Rept. of Investigations 3102, 1931, 7 pp.
Leitch, R. D., The Acidity of Several Pennsylvania Streams During Low Water: Bureau of Mines Rept. of Investigations 3119, 1931, 10 pp.
Leitch, R. D., Acidity of Drainage from High-Pyritic Coal Areas in Pennsylvania: Bureau of Mines Rept. of Investigations 3146, 1932, 15 pp.
Leitch, R. D., Yant, W. P., and Sayers, R. R., Character of Drainage from Mines in the Thick Freeport Coal Bed, Pa.: Bureau of Mines Rept. of Investigations 3193, 1932, 29 pp.

[6] Mangan, J. W., Water Problems in the Anthracite Region in Pennsylvania: District Engineers' Conference, Pennsylvania Department of Forests and Waters, Harrisburg, Pa., October 1938, 4 pp.

County, alone three large companies representing 15 collieries had a rated pumping capacity of 278,050 gallons a minute in 1939 and pumped more than 58 billion gallons of water during the year.

In segregating the region into fields - Northern, Eastern Middle, Western Middle, and Southern - it is observed that the Northern, Southern, and Western Middle fields have the most acute water problem as well as the bulk of the population. The Eastern Middle field does not have an acute problem owing to the fact that a large expenditure of capital in more prosperous days provided drainage tunnels that indicate a way to solve difficulties in other sections. The Northern and Eastern Middle fields, which have the shortest life, have the greatest density of population.

In the Northern field (figs. 2 and 3), comprising Lackawanna and Luzerne Counties, Lackawanna County operations present the most acute situation in progressive deterioration. Luzerne County conditions parallel those in Lackawanna but follow a stage or two behind.

In Lackawanna County alone three large companies, representing 15 collieries, expended about $2,300,000 in pumping more than 58 billion gallons of water at the rate of 278,050 gallons a minute during 1939. In 1923 the volume of water pumped in comparable operations was only 81,458 gallons a minute.

The coal measures in this county are crossed by 70.6 miles of surface streams. These stream beds leak water underground in varying quantities at various locations. How much can be kept outside by preventive measures is the problem.

A similar problem in Luzerne County is emphasized further, as regards the future, by the fact that if the waters from the Lackawanna County collieries are not held back or controlled they surely will present an insuperable task for the deeper workings in Luzerne County as operations in the upper field are abandoned.

Mine water in the Eastern Middle field (fig. 4) is voided largely through the Jeddo tunnels.

The Jeddo tunnels[7] were begun in February 1891 and completed in 1894. Connecting and auxiliary tunnels have been constructed at different times, the last being opened for use in 1935. The Jeddo tunnels have a capacity of more than 150,000 gallons a minute. On August 24, 1933, during a flood week, the Jeddo weir showed 139,100 gallons a minute. An approximate power charge that would result if water flowing through the Jeddo drainage tunnel was pumped against a head of 554 feet to the surface from a central pumping plant is indicated to be 20 cents a ton or 6 cents a million gallons a foot vertical. The average minimum daily flow observed in this tunnel during an average month is 11,030 gallons a minute, while the average maximum flow for a similar period is 22,190 gallons a minute.

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[7] Prideaux, J. H., The Jeddo Tunnel: Unpublished rept., January 15, 1939, 9 pp.

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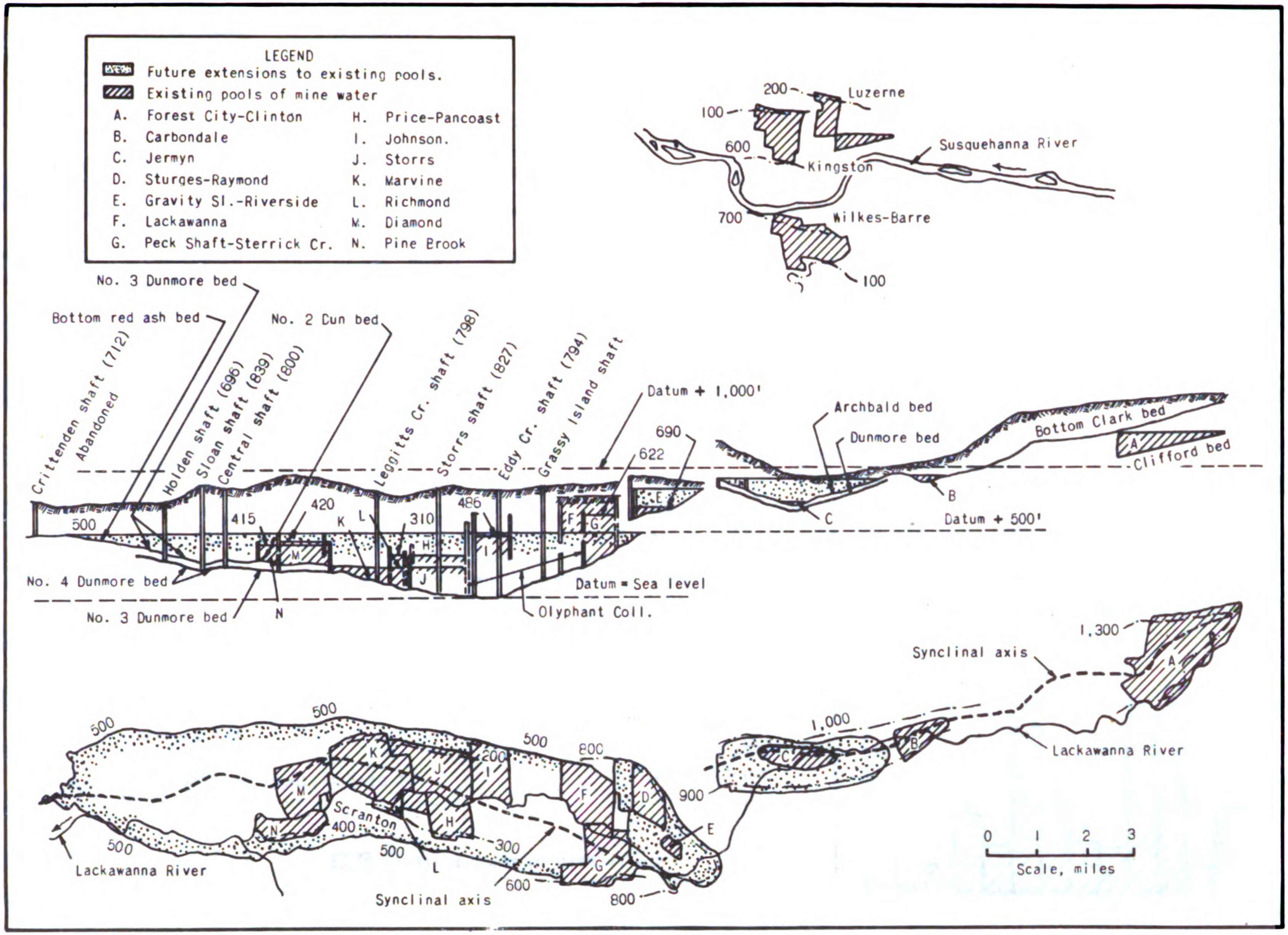

Figure 2.- Structure map of the Northern anthracite coal basin, Pennsylvania.

Pools		Elevations			Content	
Map designation	Name of pool	Present	If not held at the present elevation would overflow to ______ at _____ elevation.	Horizontal bore holes (present control point)	Estimated gallons at present elevations	Remarks
A	Forest City-Clinton	1,350	-	-	537,625,000	Water now seeps to river at 1,350.
B	Carbondale	953	-	-	25,000,000	Flows over knuckle to Jermyn.
C	Jermyn	720	Surface 925	-	106,000,000	
D	Sturges-Raymond	810	-	-	350,000,000	Overflows to E pool.
E	Gravity Sl.-Riverside	690	Surface 835	-	215,000,000	
F	Lackawanna	777	-	-	753,723,000	Filled to surface.
G	Peck Shaft-Sterrick Cr.	622	Olyphant Colliery 640	542	400,000,000	
H	Price-Pancoast	310	Marvine Colliery 420	310	216,480,000	
I	Johnson	486	Olyphant Colliery	420	196,813,000	
J	Storrs	220	Marvine Colliery 330	-	852,720,000	
K	Marvine	240	Storrs Colliery 330	-	806,602,000	
L	Richmond	310	Marvine Colliery 390	305	117,868,000	
M	Diamond	420	Marvine Colliery 432	-	386,900,000	
N	Pine Brook	415	Baker Colliery	395	283,668,000	

Synclinal axis is of the lowest bed worked.

Cross sections are along synclinal axis.

Scale of sections are:

$1 \text{ inch} = \frac{\text{Vert.}}{\text{Hor.}} \quad \frac{200}{2640}$ or about 13.2 to 1.

▨ Existing pools of mine water.

1,393,000,000 gallons of water in Elmhurst Dam.

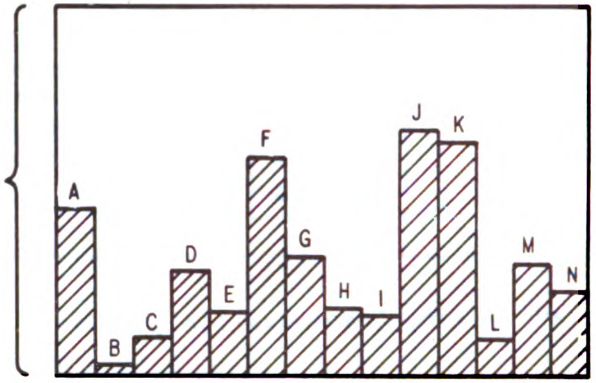

Figure 3.- Key and supporting data for structure map of Northern anthracite coal basin, Pennsylvania.

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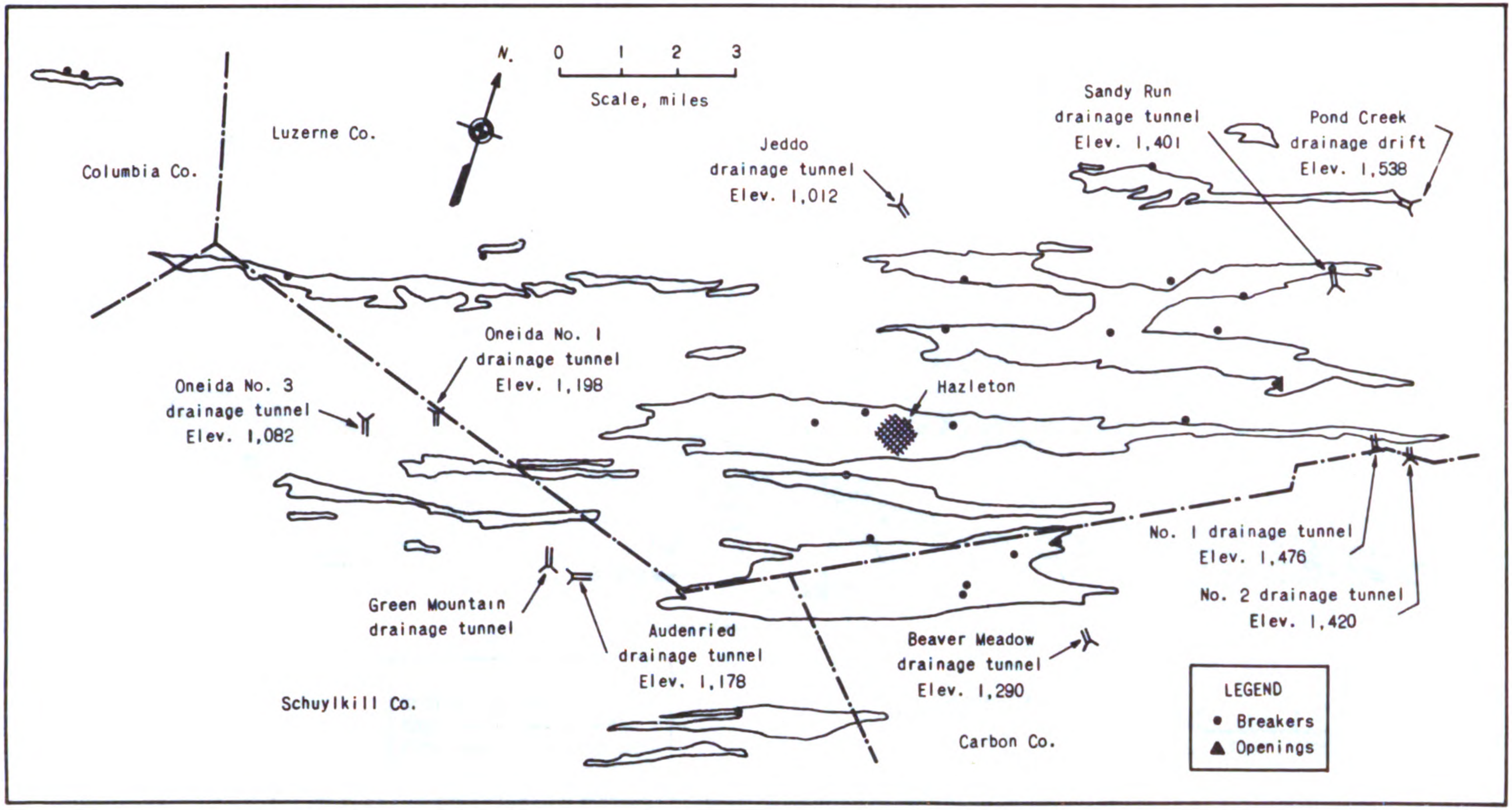

Figure 4.- Eastern Middle coal field located in Columbia, Carbon, Schuylkill, and Luzerne Counties, Pa., showing location of breakers and mine openings.

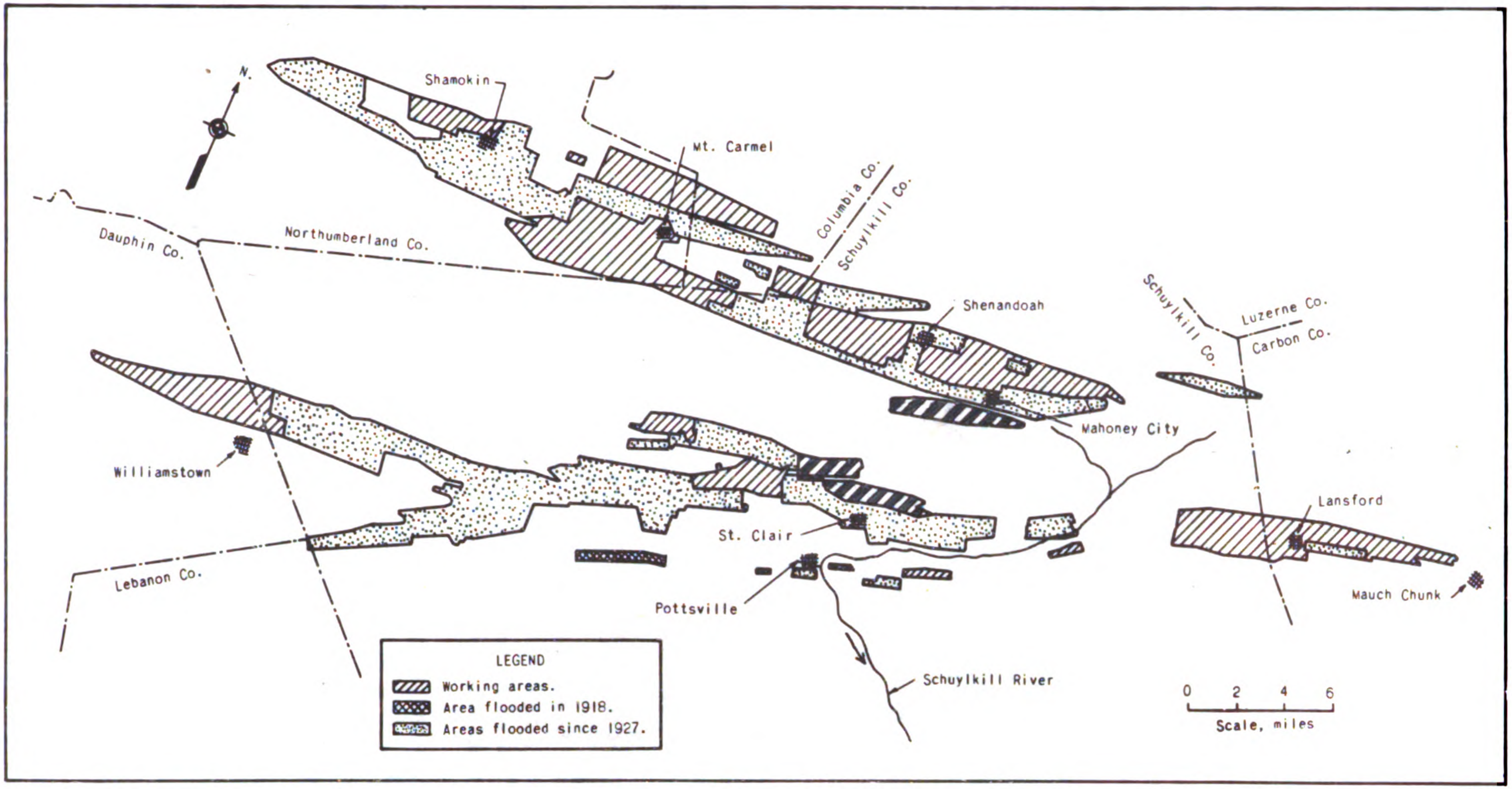

Figure 5.- General map showing active major operations in Western Middle and Southern coal fields in relation to flooded collieries.

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The Western Middle field is now concerned with a water problem involving flooded mines that has focused attention on drainage tunnels as a means of solution. "Bootleg mining" is prevalent in this region. Ten collieries in this field pump 23,503,143,000 gallons annually at a cost of $982,953. One company alone is pumping 13,706,000,000 gallons annually at a cost of $641,200 and faces an additional annual load of 9 billion gallons at an estimated cost of $118,300, owing to recent abandonment of a large colliery. Pumping costs approximate 16 to 20 cents a ton of coal mined in the field.

The importance of diverting surface water to eliminate pumping is shown by conditions in mine-inspection district 5 in the Western Middle field (fig. 5). The total rainfall in this field in 1935 was more than 92 billion gallons. The total water pumped was nearly 66-1/2 billion gallons (72.2 percent of the rainfall). The operating mines had a production of 8,703,057 tons to carry a load of 31.81 tons of water a ton of coal produced. Of the 66,468,000,000 gallons of water pumped, 34,427,000,000 (51.8 percent) was from idle mines and 32,041,000,000 (48.2 percent) from operating mines.

An example of definitely reducing the infiltration of surface water into underlying and adjoining mine workings through the control of surface drainage by stream diversion follows:

Before 1933 the Mahanoy Creek, between Mahonoy City and Girardville in the Western Middle coal field, was a meandering stream that overflowed its channel during high-water periods, covering an extensive surface area, some of which was undermined; a large portion of the underlying coal was unmined owing to the water-saturated strata overlying the coal beds. The stream channel also presented an obstacle to sanitary sewage conditions in the towns and villages adjoining the creek in this vicinity. During 1933 a Federal Government project was initiated for realining, regrading, and rip-rapping the stream channel. The work was completed in 1937. An immediate decrease in the amount of water entering the underground mine workings was noted, as is evidenced by the pumping records at three Western Middle coal field collieries within the limits of the project.

The average annual rainfall from 1927 to 1933, inclusive, was 49.10 inches, while the average annual rainfall from 1934 to 1937, inclusive, was 51.44 inches.

The average number of gallons of water pumped annually in 1927 to 1933, inclusive, was 4,278,000,000, while the average number of gallons of water pumped annually from 1934 to 1937, inclusive, was 2,448,000,000.

Although the average rainfall increased 2.34 inches (4.77 percent), the average annual pumping load decreased 1,830,000,000 gallons (42.8 percent).

Owing to the steep pitches and depth of workings in the Southern field, pumping is a costly addition to other mining expenses. Nine collieries pump 14,254,086,000 gallons annually at a cost of $626,420. Pumping costs in this area average about 20 cents a ton of coal mined. About 20 tons of water must be pumped for each ton of coal produced in the Southern field. Breaking of pillars separating working mines from abandoned mines by "bootleg" coal miners has increased the problem and now seriously menaces mining operations.

Rainfall is quickly noticeable in the workings of this field. In mine inspection district 7 of the Southern field (fig. 6) the rainfall in 1935 was 92,083,000,000 gallons. The total water pumped was 36,274,000,000 gallons (39.4 percent of the rainfall). The operating mines had a production of 3,236,575 tons. To recover this tonnage 46.68 tons of water was pumped for each ton of coal produced. Of the 36,274,000,000 gallons of water pumped, 23,124,000,000 gallons (63.8 percent) was pumped from idle mines and 13,150,000,000 gallons (36.2 percent) from operating mines.

The largest reserves of anthracite lie in the Southern Field, which also has the most difficult mining conditions.

POSSIBLE REMEDIES

In seeking remedies for the water problem the following factors must be considered: Nature of the remedies, effect of remedies, cost of correctives, value of benefits, and methods of financing.

Possible remedies are:

(a) Flumes across breaks in stream beds.

(b) Side-hill ditches to avoid crop falls and conduct water to the stream beds.

(c) Diversion of streams to new and safe channels.

(d) Silting stream beds to render them more impervious.

(e) Cleaning and widening out channels to provide freer flow.

(f) Control and cooperation by all concerned to conduct future mining operations with the object of controlling inflow.

(g) Check dams, reforestation, and developments such as are being sponsored by the United States Department of Agriculture.

(h) Flood control by reservoirs at headwaters and downstream dikes, which also might be utilized in connection with sewage, drinking-water supply, and washery water in times of low water.

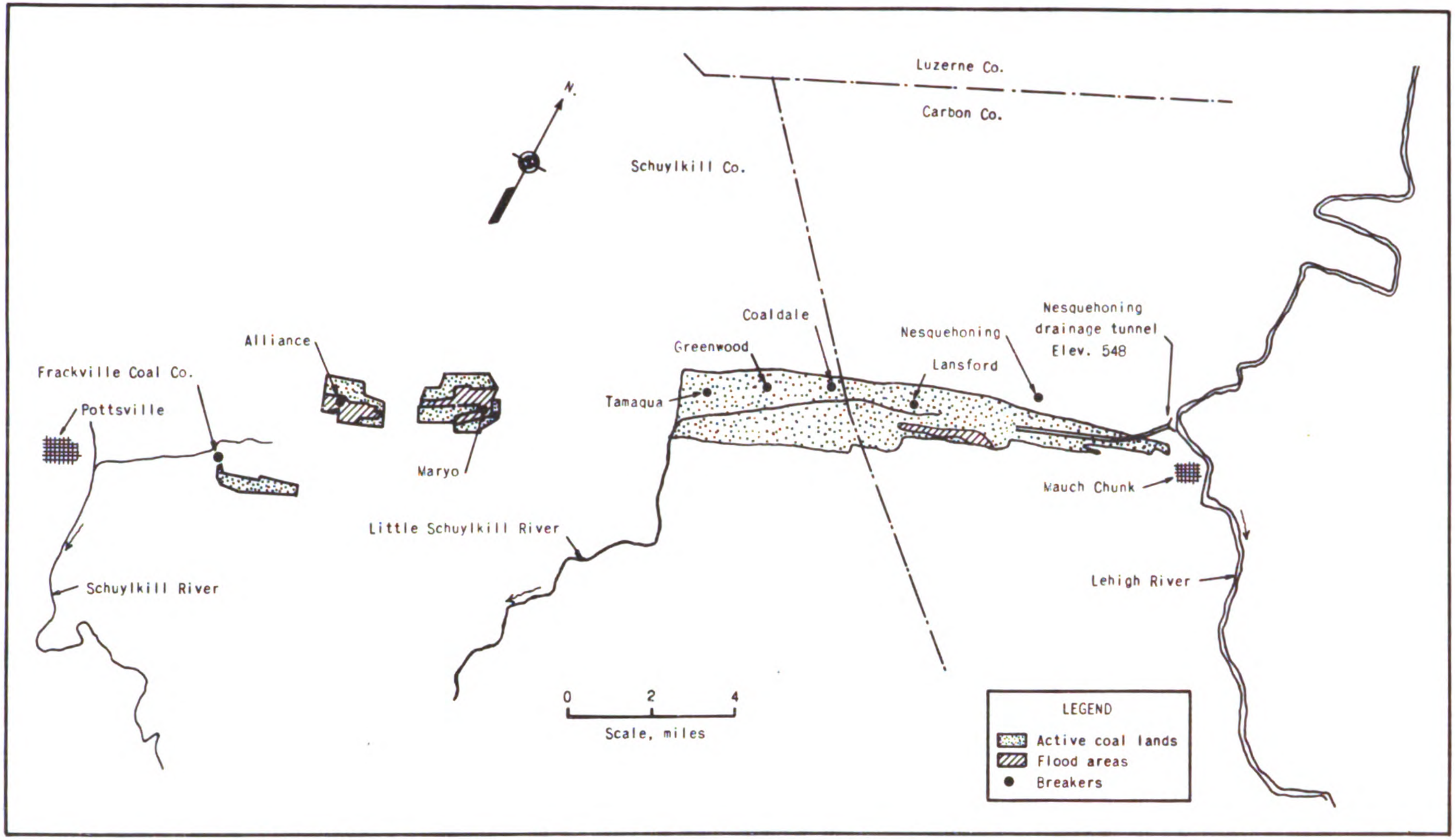

Figure 6.- Map showing flooded mine and active coal areas in eastern section of Southern field.

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(i) Pumping plants.

(j) Drainage tunnels.

Some of the remedies suggested have been and are being applied successfully in the region.

An example of efficient use of a flume is the installation of 5,500 feet of 7-foot creo wood flume by a large company in the Northern field. During the first 6 months of 1939 before this flume was built, 3,624,135,000 gallons of water was pumped at the shafts involved, the rainfall during this period having been 15.71 inches. During the first 6 months of 1940, after erection of the flume, 3,202,968,000 gallons was pumped, and the rainfall during this period was 19.91 inches. This shows a pumping decrease of 421,167,000 gallons (11.62 percent), while the rainfall during the comparative period increased 4.20 inches (26.72 percent).

There are numerous drainage tunnels in the region, the outstanding one being the Jeddo tunnels previously mentioned, which are situated in the Eastern Middle field.

HOW CAN THE PROBLEM BE SOLVED?

The answer to the question "How can the problem be solved?" is of paramount interest to the industry and is intended to arrest the progressive destruction of colliery operations, thereby saving and extending the anthracite resources, on which depends directly the community life of more than 1-1/4 million inhabitants and which contributes greatly to the national income and well-being. More than 10 percent of the State's and 1 percent of the Nation's population reside in the anthracite region.

It has been stated that because of the magnitude of the problem its solution by the mining industry unaided is beyond the resources of the operators.

Coal, oil, natural gas, and water power are the principal sources from which we obtain the energy essential to our industrial civilization. In recent years the conservation of these great natural resources, their orderly development, their availability for the national defense in case of need, and the preservation in economic health of the industries that make them available have become matters of national concern.

In its report[8] on Energy Resources and National Policy the Energy Resources Committee states:

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[8] Report of the Energy Resources Committee to the National Resources Committee, Energy Resources and National Policy: January 1939, 435 pp.

> Current evidence points to greater reliance on coal than on any other source of energy. Except for a brief interlude, coal may continue in the future, as it has in the past, to be more important than all the other sources of energy combined. This prospective dependence of our civilization on coal should lead us to consider what problems will arise concerning our coal reserves long before complete exhaustion is threatened.

The anthracite region is face to face with a problem that takes precedence in this direction.

There are certain things that must be considered in granting public assistance:

1. The question of eligibility must be settled by the determination of public benefit.

2. The project must have a sponsor.

3. A conclusive argument must be developed fully to prove legally that such a project is of indisputable public benefit.

There is no question that the anthracite industry plays a very important part in our national welfare, but for reasons previously stated the attention of the general public has not been focused on its economic dilemma.

The total coal reserves of the Nation are enormous, but the tonnage of high-rank coal in the ground is decidedly small. Anthracite[9] constitutes only about one-half of 1 percent of the total tonnage of our national coal reserves, bituminous coals a little more than two-fifths, and the much less desirable subbituminous coals and lignites the remainder. The last are in the western half of the United States. We are exhausting the high-rank beds of coal and working down. Furthermore, up to January 1, 1937, 29.5 percent of the anthracite had been mined or lost.

Anyone who has lived in the anthracite region for the past 25 years knows what happens when the tonnage produced annually drops from 100 to 50 million tons.

An extensive investigation is not required to ascertain that unless the water problem is solved the expectancy of life of the industry, if it is to continue profitable at its present capacity, is by no means a matter of centuries, but a matter of decades and even years in many instances. A feasible and practical solution of this problem can extend the life of the region to at least twice its present outlook.

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[9] See reference 8.

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The matter of income from this industry concerns the community, the State, and the Nation. The 50 million tons of anthracite now produced annually have a value at the breaker of nearly $200,000,000. More than 100,000 men are employed directly in the mines, and more than one and one-quarter million people in the region depend directly or indirectly on this industry. Virtually 90 percent of the anthracite tonnage is handled by nine railroads, which depend more or less on this traffic for a substantial portion of their business. Considering the vested interests that serve the community through business, and all that enters into homes that have value only if the tenant can earn a living, the economic picture becomes one of billions of national wealth. Furthermore an abandoned mine filled with water, for whatever reason, menaces the lives of all workmen employed in adjacent workings.

GOVERNMENT PARTICIPATION IN PROBLEM

The interest of the Federal Government in the water problem is based as much upon human values as it is upon the economics of the industry.

No later than February 15, 1937, President Roosevelt sent a message to Congress transmitting a report[10] of energy resources of the United States by the National Resources Committee, in which he stated in part:

> This report represents the joint effort of many specialists both within and outside of the Federal Government. It suggests policies, investigations, and legislation necessary to carry forward a broad national program for the prudent utilization and conservation of the Nation's energy resources.

In a summary of our energy resources and national policy the National Resources Committee[11] states:

> With respect to the anthracite industry, it is to be noted that measures designed to deal with the economic and human distress in that industry in Pennsylvania have recently been proposed by a special State investigating commission. Without in any way passing judgment on those proposals, we make no recommendations here concerning anthracite in the belief that the Commonwealth of Pennsylvania should first exhaust its own remedies. If it finally becomes evident that the Commonwealth cannot cope with the anthracite problem, then it may become necessary to extend the jurisdiction of an appropriate Federal agency to that industry.

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[10] Energy Resources Committee, Energy Resources and National Policy: Rept. to National Resources Committee, January 1939, p. III.
[11] Work cited in footnote 10, pp. 33 and 119.

In the event of failure of the State to act, the need for conservation of anthracite indicates that the Federal Government should assume responsibility.

Many in the anthracite region believe that any solution of the water problem can and should be handled through a series of W.P.A. projects in the various political subdivisions involved and under the engineering supervision of the proper State departments.

During the past year about 30 W.P.A. projects bearing on the water problem in three counties have come to the attention of the author either as proposals or projected proposals that would involve an expenditure of more than 30 million dollars. In these proposals it is emphasized that such projects would utilize unemployed labor in the various boroughs of the anthracite region on work which, in turn, would ultimately react to decrease unemployment. The outstanding request in these proposals is for assistance in an engineering and cost-finding survey of the water problem.

During the past year the author became interested in the water problem as a representative of the Federal Bureau of Mines on the Delaware Drainage Basin and Susquehanna Drainage Basin Committees of the National Resources Planning Board. The State of Pennsylvania is represented on these committees by those who are advised of the anthracite water problem, including Charles E. Ryder, chief engineer of the Pennsylvania Water and Resources Board.

One of the functions of the Drainage Basin Committee is to assist in planning a sound program of public works. This committee's views are advisory only and are given to the National Resources Planning Board for its guidance in reviewing public works programs that come within the scope of the committee's work.

At the request of the chairman and water consultant of the Drainage Basin Committee the author investigated the status of the water problem during the past year. This investigation consisted essentially of conferences with operators throughout the region. The outstanding picture derived from this investigation was the tremendous amount of engineering effort that has been expended at considerable expense by the industry itself, both from its own desire and at the request of the State Department of Mines, to find a solution through its own efforts and the medium of assistance from the Government. On July 28, 1938, work was begun by the State Department of Mines, which made comprehensive maps of the region showing all streams and surface contours, principal mines, ownership of lands traversed by streams, approximate number of miles of streams in the various coal fields, and number and size of streams that will require relocating.

In an effort to determine what could be done to help the anthracite-mining region in its water problem, a meeting was held by the Susquehanna Drainage Basin Committee at Harrisburg, Pa., on July 12, 1940, which was attended by J. F. K. Brown, H. H. Otto, E. B. Snyder, and W. C. Muehlhof, mining engineers representing the four fields of the region, who presented the problem from the practical standpoint of the mine operators.

All conferences indicated that the exact solution of the water problem is not readily apparent, and all evidence points to the need for the coordinated efforts of public and private and State and Federal agencies in an investigation of the water problem for the region as a whole. A sound engineering approach and solution are imperative. There is enough merit in the endeavor to invite and obtain aid to carry out projects that in themselves can waste millions of dollars and not do anything of lasting value.

In presenting the problem to the Susquehanna Drainage Basin Committee the mining-engineer representatives of the anthracite-mining companies and the author suggested that an investigational project covering 1 year and costing $300,000 was needed for a complete engineering study.

The following resolution was passed by the Susquehanna Drainage Basin Committee relative to the water problem:

> It is resolved that the Susquehanna Drainage Basin Committee approve a preliminary examination to determine the advisability of making a study of mine drainage in the anthracite region and endeavor to recommend a type of organization to make that study and a sponsor therefor.
>
> On agreement of the committee, the following subcommittee was appointed by the chairman to study the problem: Charles E. Ryder, chief engineer of the Pennsylvania Water and Power Resources Board, Chairman; F. A. Pitkin, executive director of the Pennsylvania State Planning Board; J. P. Walsh, Secretary of Mines, Pennsylvania; S. H. Ash, district engineer, Federal Bureau of Mines; and H. L. Shirley, director, Allegheny Forest Experiment Station.

It appears that the interest and action of the Federal Drainage Basin Committees offer an approach to a solution of the water problem, if the industry decides it is desirable and provides a strong regional committee representing the industry to assist the subcommittee in deciding on a valid plan for a project that will lead to a sound engineering study and report, outline the problem, suggest projects that can be approved and carried to completion, and be within the economic resources of the industry.